

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: September 6, 1979

Forwarded to:

Honorable Howard Dugoff
Administrator
Research and Special Programs
Administration
Department of Transportation
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

P-79-27

At 1:10 a.m., c.s.t., on January 19, 1979, in North Richland Hills, Texas, an accumulation of natural gas in a house was ignited by an unknown source. The resulting explosion and fire destroyed the house. One resident was killed and another was critically injured.

The houses in the accident area were connected to a 6-inch Lone Star Gas Company gas main by 1 1/4-inch service lines. The service connection was made with two 90-degree elbows to allow for both horizontal and vertical movement of the line as the soil moved. This "swing connection" did not prevent the fracture of the pipe. Investigators have determined that gas escaped from a circumferential fracture at the threads of a 1 1/4-inch nipple above the service tap on the main. The wet clay soil at the accident site retarded the upward movement of the leaking gas. The gas moved laterally along the pipe; through the drier, more permeable clay; and into the house.

On November 27, 1978, a leak occurred on the Lone Star system in Arlington, Texas. This leak was also at the threaded section of a main/service line connection. The leak resulted in an explosion in which one person was killed. The conditions at the January 19, 1979, accident were also similar to those which existed on October 4, 1971, when a connection failed in North Richland Hills. ^{1/} In all three cases, the pipelines were located in dense clay soil that swells when it is wet. The movement of the soil applied force to the pipes which in turn induced stresses which concentrated at the threaded connections of the 1 1/4-inch nipple at the service tap. The continued stress eventually caused the threaded areas to crack. In the 1971 accident, the effects of the stress were heightened because of brittleness caused by the hydrogenation of the galvanized pipe used at that connection. Investigators determined that the 1978 leak was also induced by a combination of stress and corrosion.

^{1/} For more detailed information read "Pipeline Accident Report-- Lone Star Gas Company, North Richland Hills, Texas, October 4, 1971" (NTSB-PAR-72-3).

The pipe involved in the January 19, 1979, accident will be tested by Metallurgical Consultants, Inc., of Houston, Texas. The type of pipe--plain steel or galvanized steel--has not yet been determined. The Board has requested that the testing be expedited.

As a result of its investigation of the 1971 accident, the Safety Board recommended that Lone Star make random inspections of its main/service line connections to determine conditions and initiate corrective action as necessary. Lone Star replied that the leak was due to the corrosion action on the galvanized pipe rather than stress. Lone Star stated that its construction standards "have never permitted the use of galvanized pipe underground. Galvanized pipe has been utilized in the past for above ground connections. Construction records on work in this area indicate that black steel pipe was used. Any use of galvanized pipe was inadvertent and unusual. Since the date of this occurrence, all of our warehouses have been purged of galvanized pipe of any type. Its use has been prohibited. Since the date of this accident, we have followed closely all repairs on our system. Excavations number in excess of 1,000 a month in the Fort Worth system of which North Richland Hills is a part. These excavations have failed to reveal a single similar installation. In addition, immediately following the accident several services were dug up in the immediate area. These were not determined to be galvanized pipe."

Failure of pipe at the main/service line connection with threaded couplings on the Lone Star system appears to be a recurring problem. After the 1971 accident, Lone Star only addressed the galvanized pipe-hydrogenation corrosion problem and not the stress problem. The short time between the November 1978 and the January 1979 accidents has caused the Safety Board concern as to the safety of the entire Lone Star system.

Therefore, the National Transportation Safety Board recommends that the Research and Special Programs Administration:

In conjunction with the Texas Railroad Commission, determine if the type of main/service line connection with threaded couplings installed by the Lone Star Gas Co. constitutes a hazard to life and property, and take appropriate action under Section 3(b) of the Natural Gas Pipeline Safety Act of 1968. (Class I, Urgent Action) (P-79-27)

KING, Chairman, DRIVER, Vice Chairman, MCADAMS, GOLDMAN, and BURSLEY, Members, concurred in this recommendation.


By James B. King
Chairman